

Rapa Nui Landscapes of Construction Project (LOC 9)

Multi-scalar Survey of the Southwestern *Ara Moai* between Ahu Hanga Tetenga and Ahu Hoa Anga Vaka A Tua Poi
2014



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Rapa Nui Landscapes of Construction

The Rapa Nui Landscapes of Construction Project (LOC) is funded by a grant from the Arts and Humanities Research Council in the UK. Based at the Institute of Archaeology, University College London, the project is directed by Sue Hamilton of UCL (principal investigator) and Colin Richards of the University of Manchester (co-investigator), in collaboration with Kate Welham of Bournemouth University (co-investigator). The University of the Highlands and Islands (Project Partner) is represented by Jane Downes.

On the Island, LOC works with Rapanui elders and students and in close cooperation with the *Corporacion National Forestal (CONAF)*, Rapa Nui, and the *Museo Antropológico P. Sebastián Englert (MAPSE)*.

The main aim of the project is to investigate the construction activities associated with the Island's famous prehistoric statues and architecture as an integrated whole. These construction activities, which include quarrying, moving and setting up of the statues are considered in terms of Island-wide resources, social organisation and ideology.

The Project is not just concerned with reconstructing the past of the island, but is also contributing to the 'living archaeology' of the present-day community, for whom it is an integral part of their identity and their understanding and use of the island. LOC is working with the Rapanui community to provide training and help in recording, investigating and conserving their remarkable archaeological past. Fieldwork between 2008 and 2013 was undertaken under a permit issued by the *Consejo de Monumentos Nacionales, Chile* (ORN No 1699 CARTA 720 DEL 31 del 01.2008).

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Multi-scalar Survey of the Southwestern Ara Moai between Ahu Hanga Tetenga and Ahu Hoa Anga Vaka A Tua Poi, 2014

by Sue Hamilton & Mike Seager Thomas

1. Introduction

The fieldwork described below was undertaken for, and at the behest and with the written permission of the *Corporacion National Forestal (CONAF)*, Rapa Nui, according to a two week timetable submitted by LOC to CONAF in January 2014. Its aim was two-fold. First, the continued characterization of the southwestern *Ara Moai*, in terms of its conservation and future heritage management in advance of the *Ara Moai*'s development as a tourist trekking trail, and second the provision of further data against which to assess the observations made by us last year (LOC 2013). This work extends last year's survey of the *Ara Moai* from the outer plaza of Ahu Hanga Tetenga (667183/ 6997478) to Ahu Hoa Anga Vaka A Tua Poi (665521/ 6996443) and provides the first detailed coverage of a section of the *Ara Moai* beginning at a large supine *moai* up the valley leading northwest from Runga Va'e (666371/ 6997317), to the rising ground immediately west of Ahu Oroi (665652/ 6996812).

For the 2014 survey our objectives on the ground were conditioned both by CONAF's ongoing needs in terms of conservation and heritage management and the results of last year's *Ara Moai* survey. As far as the *Ara Moai* is concerned, CONAF's primary interest is conservation and presentation. It needs to know where it is, what archaeology is associated with it, the current state of preservation of this, what amongst this is important (and/or important to preserve), what is not, and why, and how best to present it to the public. It also requires a quality record that is both accessible and of practical long term use. LOC by contrast places a greater emphasis on interpretation. We want to know if the *Ara Moai* are indeed roads or just alignments of *moai*. We want to know if the *moai* demarcating them were standing or not. And we want fully to understand all the features comprising, on, or associated with the *Ara Moai*: how to distinguish them, how they relate to each other, in terms of their use and landscape context, and how these compare to similar features elsewhere on the Island. Although our 2013 survey suggested some possible answers to these questions the lack of systematic work on the wider context of the *Ara Moai* and its environs till now has left many of them open.

In the field, the strategy we adopted in order to accommodate these different needs and interests combined the following: walkover survey, consisting of the plotting and textual description (morphological, structural/ sedimentological, and positional) on LOC's pre-prepared recording sheets of the *moai* and other archaeological features along it; 2-D and (for the *moai*) 3-D photography; and detailed geophysical (electromagnetic and fluxgate gradiometer) survey of selected stretches of the *Ara Moai*. We also conducted a survey of nine standing and one prone *moai* at Rano Raraku to provide a control for observations made by us last year of differential weathering profiles on the fronts of prone *moai* along the *Ara Moai*. Our particular objectives were as follows:

- To investigate and clarify the evidence for the route of the *Ara Moai* between the outer plaza of Ahu Hanga Tetenga

and Ahu Hoa Anga Vaka a Tua Poi.

- To record and describe the contexts and condition of the *moai* associated with it.
- To document and describe the associated/ proximate archaeological features along this route.
- To identify the key diagnostic features of these.
- To generate information that can aid the interpretation, preservation and presentation of the *Ara Moai* and its associated *moai*.

In all we recorded and mapped 125 features of archaeological interest and conducted geophysical survey at three locations along the assumed route of the *Ara Moai*, doubling the length of the road surveyed (and for which an informed management strategy is now possible) and generating a sample that, for interpretative purposes, is directly comparable to that generated last year (LOC 2013). The results of the survey confirm the priorities suggested for conservation and future heritage management last year. They also confirm observations made by us about the grouping of domestic-type features, about the close spatial association of these with the *Ara Moai* and the *moai* demarcating it, and the deliberate erection and/ or abandonment of the latter in a standing position. But it has also led us to some new lines of interpretation. For example, we can now attempt a characterization of the 'road' itself (precluded last year by the interpretative ambiguity of the features comprising it) and can say more of the landscape distribution of sites (made difficult last year by the patchy vegetation cover). We have also learned more about the morphology of features, which allows us more reliably to categorize and group them. Once again, however, this is an initial evaluation and we conclude by making suggestions for future, continued documentation, conservation monitoring and analysis of the archaeology of the *Ara Moai* and its long term preservation and interpretation.

2. Field walkover survey

Introduction

Our 2014 survey focused on a stretch of the *Ara Moai* between a large supine *moai* up the valley leading northwest from Runga Va'e (066371/ 6997317), to the rising ground immediately west of Ahu Oroi (665652/ 6996812). Between these two points it aimed to identify, describe, photograph and geo-reference (and later, GIS map) every visible archaeological feature (Figure 1; appendix 1). At a more superficial level this was extended east to the valley immediately to the north of Ahu Hanga Tetenga (667183/ 6997478) (its outer plaza), where last year's survey ended, and west to Ahu Hoa Anga Vaka A Tua Poi (665521/ 6996443). In the absence of a continuous and unambiguous prehistoric road, we surveyed a wide transect, extending up to 100 m either side of a modern footpath, which links the *moai* thought to line it. We also included a handful of features outside the transect that were visually dominant from the 'road' (e.g. Ahu O Marari), and which may be relevant to its interpretation. For the survey as a whole our focus was on the form, preservation and relationships of the archaeological features

comprising and associated with the putative road. In studying and documenting *Ara Moai* in this way, we hoped to place it more clearly both in a landscape and wider archaeological context, and in so doing make it accessible both for interpretative and presentational purposes, and to isolate conservation priorities. In the end the survey was conducted over 9 days. For two of these we were accompanied and guided by CONAF ranger, Julio Haoa Avaka.

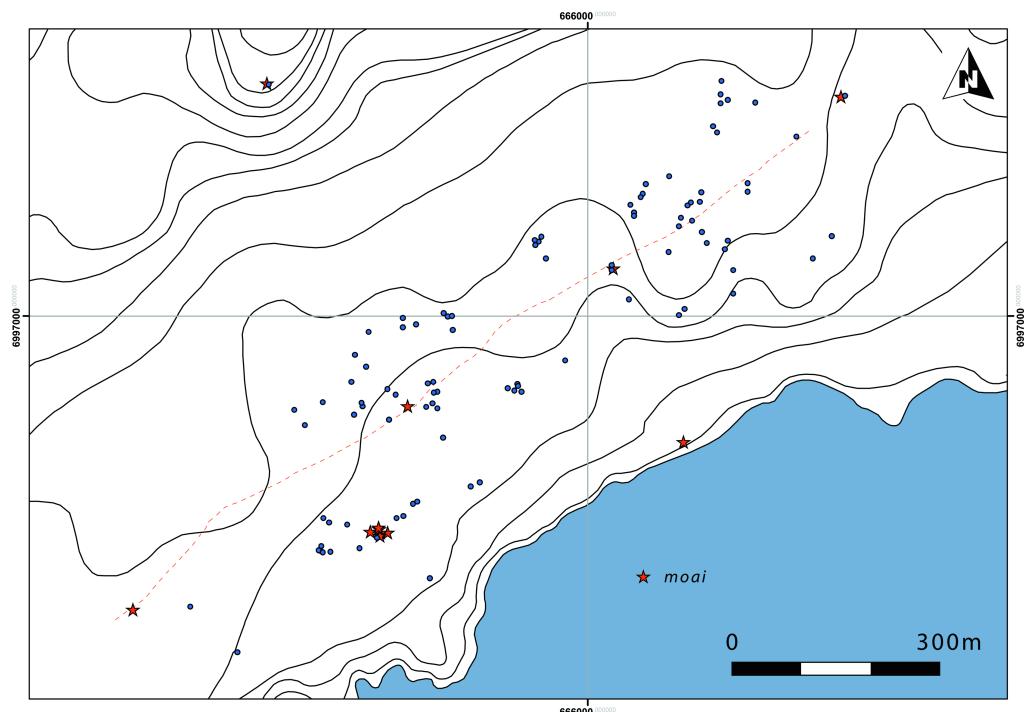


Figure 1.

The distribution of archaeological features within the part of the transect subjected to detailed survey. The red dashed line (a modern footpath) marks the approximate route of the Ara Moai

Method

Working from east to west, we walked at right angles across the transect with surveyors spaced at approximately 20 m intervals, recording and, using pole-mounted, kite and handheld cameras, photographing each feature encountered. In order to achieve a consistent, easily comparable record, features were recorded on LOC's pre-prepared prompt-led *Walkover Survey Record Sheet* (Appendix 2). Data recorded included:

- A unique feature number (e.g. AMS134)
- The type of feature
- The numbers of any features with which it is associated
- Its physical relationships with these
- Its 13 figure grid reference, using the UTM WGS84 grid (obtained using Brunton *Multi-Navigator* or Garmin *Etrex* hand-held GPSs)
- Its dimensions

- The numbers of the photos taken
- Current landuse
- A description of the feature, including the sizes and types of stones used, and their sorting
- An interpretation of the feature based upon its description and relationships
- Its perceived significance (with a justification of this perception)
- Its visibility

Later these data were transferred to an *Excel* worksheet that can be used to produce GIS generated distribution maps (e.g. *Figures 1, 12 & 13*). The documented database includes the photographs taken of each feature. These photographs and datasheets and GIS links, all of which can be cross referenced using their unique feature number, are stored digitally and appended as digital appendices to this report (*Digital appendices 1, 2 & 4*).

Problems and solutions

The first and main problem associated with any large scale survey of the *Ara Moai* is the scarcity of physical evidence for it on the ground. In order not to miss it we surveyed a broad transect, but the relationship between what we recorded and the *Ara Moai* itself often remained unclear. The second problem is related to the first: we can only assess what we can see. Between Ahu Hanga Tetenga and Ahu Hoa Anga Vaka A Tua Poi, current land use is mostly rough pasture and the visibility of surface features good, but low features, such as house pavements, are still difficult to see. Our response to this was to walkover the same bit of ground repeatedly, and although this did not often throw-up new features, sometimes it did, and it is certain that our feature record is incomplete. The third problem relates to the interpretation of features. How is the archaeologist to tell the difference between one undressed stone structure and another when it has fallen down and/ or the stone from it scavenged. Stone size distribution helps here but the interpretation of many of these features remain ambiguous. Finally *ahu* and features close to *ahu* are culturally sensitive, making access to them problematical.

Results

The 125 mapped features (*Appendix 1*) were divisible into 20 different feature types. Features occurred both in isolation and as parts of larger 'feature complexes' (groups of spatially associated features).

- *Ahu*. Six *ahu* were recorded, one immediately adjacent to the *Ara Moai* (AMS169), and three on the periphery of the survey transect: that is to say close to, but not in direct association with the *Ara Moai* (AMS128, AMS209 and AMS241). (The other two — AMS118 and AMS119 — were recorded as of visual significance from it). Owing to the sensitivity of *ahu*, these were only surveyed from a distance, but it is worth noting of those within the transect that three were image *ahu* (AMS169, AMS209 and AMS241), that one of these had been completely destroyed (AMS169), and that two, one image *ahu* (AMS209)

and one simple rectangular *ahu* (AMS128), were abutted by later *manavai* complexes, and that all were associated with larger feature complexes. AMS209 (Ahu Oroi — see cover image) is additionally notable for the presence in its rear wall of a fragmentary, inward-facing *moai* in local red scoria, and AMS241 (Ahu Hoa Anga Vaka A Tua Poi) for its close association with the parts of another (AMS242) (Tilburg 1986).

- *Ahu facia* block. A weathered *ahu facia* block in red scoria from Puna Pau (AMS229) was noted on rubble to the rear of *manavai* complex AMS137. With *moai* AMS153, this provides supporting evidence for the identification in the *Atlas Arqueológico* of this feature as an *ahu* (Cristino *et al.*, pl. xiv). (Figure 2).



Figure 2.
Ahu facia block in Puna Pau red scoria (AMS229) to the rear of the Tuta'e manavai complex (AMS137)

- *Avanga/ hare moa*. The exact nature of the nine features here grouped is uncertain. All have exterior walls of small undressed boulders (rarely more than 0.5 m across), filled or surrounded by much smaller stones, and are or were rectangular with rounded ends (Figure 3). However, traces of the 'chamber running parallel to the long axis of the structure' (Stevenson & Cristino 1986, 32), diagnostic of the chicken house, are present in only two (AMS134 and AMS212), and then in only fragmentary form, and one of these (AMS212) is reported to have yielded human remains to Mulloy or the Heyerdahl team (J. Haoa pers. comm.). Rubble associated with another (AMS185) included a small weathered Puna Pau red scoria *paenga*, which may also be indicative of a funerary role at some period. All nine of those recorded by us form part of

larger feature complexes, which include *hare paenga* or *hare paenga*-type *poro* pavements (see below) (5), *manavai* (4),



Figure 3.
Ruinous Avanga/ Hare moa showing the characteristic bi-modal stone size distribution (AMS205)(cf. Figure 6)



Figure 4.
Crescentic poro pavement belonging to a hare paenga. The poro are laid on the ground surface (AMS179) (cf. (Figure 7)

unidentified fragmentary *poro* pavements (4) and *umu* (4). Two (AMS212 and AMS213) form a complimentary pair flanking Ahu Oroi (AMS209).

- Caves. Two caves were identified within the transect (AMS175 and AMS219). Both were associated with feature complexes but neither showed any traces of having been modified themselves.
- *Hare paenga* and *hare paenga*-type *poro* pavements. Four near complete *hare paenga* (AMS138, AMS204, AMS208 and AMS243) and fragments of a fifth (AMS179) were identified (Figure 4). AMS138 lies between and perpendicular to the *Ara Moai* (AMS 144) and *manavai* complex AMS137. AMS204 lacks a *poro* pavement and several of the *paenga* comprising its kerb — which was of high quality — lie on their sides embedded in the ground and it looks like it has been deliberately slighted. Both are close to *ahu* (AMS209 and AMS242, respectively) but are orientated away from them. AMS179 comprises a near complete *poro* pavement and fragments of kerb, including (to the rear) a small *pu paenga* in Puna Pau red scoria. Four crescentic *poro* pavements without associated kerbs were also found (AMS147, AMS173, AMS182 and AMS188). Like those of *hare paenga*, the *poro* comprising these are set on, rather than in the ground and often curve around the ends of the house, and as such are easily distinguishable from other types of *poro* pavement. One (AMS188) has a clear trend of larger stones towards the middle. All of these house features are associated with larger feature complexes: 6 with *avanga/ hare moa*, 3 with *manavai*, 2 with stone spreads and 5 with *umu*.
- *Hare umu*. A single circular structure — probably the outer kerb of a *hare umu* — was identified (AMS186). In the centre of the structure were a number of burnt stones, probably from the *umu*.
- Lines of stones (x2). One of these (AMS238) forms a revetment below cave AMS219. The other comprises the edge of a stone pavement (AMS225). This was located at the western end of the our detailed survey and we do not know whether it has any associations or not.
- *Manavai* and *manavai* complexes. The *manavai* encountered are of three types: sunken (3), raised (1) and raised complexes (5). Sunken *manavai* consist of a dug hole, with an up-cast spoil heap surrounding it or on its downslope side (AMS184). Sometimes it is revetted internally (AMS157) (Figure 5) or its base filled with stone (AMS184). Raised *manavai* comprise a sub-circular, often double-skinned structure continued above or built from scratch above ground (AMS194). (Typically the double-skinned walls are of small boulders filled with smaller stones) (Figure 6). The latter frequently occur in cellular complexes (AMS129, AMS135, AMS139, AMS197 and AMS210). *Manavai* are often part of larger, more varied feature



Figure 5.
Single-celled 'sunken' manava'i with a well preserved inner revetment (AMS157)



Figure 6.
The double-skinned wall of a single-celled 'raised' manava'i. Once again note the bi-modal stone size distribution (AMS194) (cf. Figure 3)

complexes. Of ours, 2 were associated with *ahu* (see above), 3 with *avanga/ hare moa*, 3 with *hare paenga*, 2 with other *poro* pavements and 5 with *umu*. But they also occur in relative isolation (AMS197) or only with other *manavai* or possible *manavai* (AMS194).

- Minor quarries. Minor stone quarrying was ubiquitous across the survey area. The evidence for it consists of outcropping bedrock with an unnaturally angular morphology, which, in the absence of the detached pieces, can only be explained by deliberate stone removal.
- *Moai*. The *moai* recorded within the transect included, in Rano Raraku tuff, three prone and one supine eyeless *moai* (AMS120, AMS121 and AMS125, and AMS123), two *ahu*-type or eye socketed *moai* (AMS122 and AMS124) and one indistinguishable torso (AMS153), and in red scoria a single heavily-weathered head (AMS224). Owing to its position in the rear of Ahu Oroi (AMS209), the other red scoria *moai* noted was not recorded in detail. AMS122 protrudes from a large pit similar to a sunken *manavai*; it may be the 'partially buried head' excavated by Routledge 'some two miles from the mountain [Rano Raraku]' (Routledge 1919, 195-6).
- Obsidian scatters. Six scatters of obsidian debitage were noted, all on bare rocky outcrops, several of which were demonstrably quarried. Three were associated larger feature complexes (AMS168, AMS231 and AMS236). Where distinguished, the obsidian included glassy and glassy spherulitic obsidian from Rano Kau and frosty obsidian from Maunga Orito. Motu Iti obsidian appears not to have been used.
- *Poro* pavements. These are mostly shapeless patches of just a few *poro*, three set on the ground like those belonging to *hare paenga*-type pavements (AMS162, AMS189 and AMS192), the remainder (5) in the ground. Owing to their lack of form we cannot assign them with certainty to any established feature type. It is likely, however, that the three surface-set patches are relicts of *hare paenga* or *hare paenga*-type pavements, and it is possible that some small, deeply set patches of small *poro* (AMS158) (Figure 7), mark former *hare paenga* entrance passageways, which were often floored in this way (e.g. AMS179). Of the eight separately recorded *poro* pavements of this type within the transect, the location and immediate associations of only two (AMS154 and AMS227) differ from those of recorded for *hare paenga* and *hare paenga*-type pavements.
- *Poro* structure. AMS152 consists of a very large rectangular pavement made of *poro* set in the ground (Figure 8). Close to and running parallel with the *Ara Moai* (AMS144), it is a rare feature type generally and unique within the present transect.
- Road features. In places within the transect the *Ara Moai* was defined on the ground by a discontinuous linear hollow,



Figure 7.

Poro pavement set into the ground — possibly the floor of a hare paenga's entrance passage (AMS158) (cf. Figure 4)



Figure 8.

Rectangular poro structure at Tuta'e (AMS152)

often filled with stones, and at one point flanked by lines of stones (AMS141, AMS142 and AMS143). Frequently the hollow is on a slope, where it could have been produced or enhanced by flowing water (AMS187, AMS222), but in one place it straddles a ridge (AMS144), which suggests that it is of human origin. In one place the hollow seems to have been paved, though the antiquity of this latter feature remains uncertain. Elsewhere the 'road' was marked by a lynchet or step (AMS171) and/ or a low bank (AMS211). All these features were on an approximate line between the recumbent eyeless *moai*.

- Rock art. AMS140 comprises a small flow lava boulder carved in low relief with several *moai*-like figures (cf. Lee 1992, 54-5). It lies close to the base of *moai* AMS121 (Figure 9).



Figure 9.
Small flow lava boulder (left) with several *moai*-like figures carved onto it in low relief (AMS140) close to the base of *moai* AMS121 (right)

- Stone spreads. That these are relics of structures rather than piles of stone is indicated by their bi-modal stone size distribution which mirrors that of *avanga/ hare moa* and *manavai* locally (see above). Owing to the lack of surviving structure, however, it is impossible to be sure to which type, if either, they belong. Given the association of *avanga/ hare moa* with larger feature sets and the occasional isolation of *manavai*, we suggest that otherwise uncategorized stone spreads which occur in isolation (AMS131) or with *manavai* (AMS194) be grouped with the latter. In all we counted 12.
- Stone structure. Two cist-like structures located on a crag to the west of Ahu Oroi (AMS209), are tentatively identified as crematoria (AMS216 and AMS218). A third, partially enveloped by stone from an *avanga/ hare moa* AMS190, is unidentified (AMS191).

- *Taheta*. Two certain and one possible *taheta* were found. AMS155 and AMS220 were associated with quarrying: AMS 155 of red scoria; and AMS220 of flow lava. Neither was associated with *avanga/ hare moa, hare paenga, manavai* or *umu*. The associations of the possible *taheta* (AMS166), which was in a large *poro*, were more domestic in character.
- *Umu*. Out of 19 *umu* identified, 12 were complete or completely reconstructable. There was one 4-stone *umu* (AMS207), three 5-stone *umu* (AMS148, AMS172, AMS178), four 6-stone *umu* (AMS130, AMS133, AMS136 and AMS163) (an observation that is of note since it conflicts with Metraux's comment that these were unlucky and rare — Metraux 1940) and four 7-stone *umu* (AMS161, AMS199, AMS201, AMS202). The 4-stone *umu* and one of the 5-stone *umu* (AMS148) were rectangular and the remaining 5, 6 and 7-stone *umu*, sub-circular. They comprised rough local flow lava, *poro* and, occasionally, re-cycled *hare paenga* kerbstones. *Umu* within the transect were associated with *ahu* (1), *avanga/ hare moa* (5), *hare paenga* and *hare paenga*-type pavements (5), *manavai* (4), other, uncategorized *poro* pavements (3), other *umu* (5), and they occurred close to the road and to eyeless *moai*.



Figure 10.
A rare well (AMS181)

- Well. AMS181 comprises a deep, stone lined pit (*Figure 10*). It is approximately square and its lining incorporates many *poro*. At about 3.5 m there is standing water. Close to it are an *avanga/ hare moa*, a *hare paenga*, an *umu* and a late 19th or 20th century water trough. The well could be of prehistoric or early modern date. It is a very rare feature type and unique within the present transect.

Discussion

A wide range of feature types was identified. These are similar to what is found in many parts of the Rapa Nui landscape (e.g. Stevenson & Cristino 1986; Vargas *et al.* 2006). Within the area of the detailed survey, most frequently encountered were: *umu* (19%), minor quarries (17%), unidentified stone spreads (11%), *manavai* and *avanga/ hare moa* (both 8%) and *hare paenga/ hare paenga*-type pavements and other *poro* pavements (both 8%). *Moai* (4%) were very definitely a minority type. Out of the total of 23 mapped features, 35 (26%) were considered of high significance because of their close proximity to the *Ara Moai*, because they were well-preserved, because they formed part of a complex of related features and/ or they were significant monuments (e.g. *ahu*), which would have been highly visible from the *Ara Moai*. 28 features (21%) assessed as of low significance mostly lacked associations or were poorly preserved. The remaining features were typical everyday types but incomplete or part of an incomplete and/or poorly preserved feature complex, and as such were assessed as of moderate significance.

At first sight these results appear different from those obtained last year. Clearly there are fewer eyeless *moai*, and more stone spreads, minor quarries and visible obsidian spreads along this stretch of the *Ara Moai*. There are also three new minority feature types, the presence of which are likely to be of importance — the *poro* structure (AMS152), the rock art (AMS240) and the well (AMS181). But if we leave these out, and the very different survey conditions encountered would certainly justify the exclusion from this year's record of at least of the obsidian scatters and stone spreads, the trend and therefore its interpretation is similar (*Figure 11*).

Interpretation last year focused on the observation that the types of features found near the *Ara Moai* are the same as those present in other places on the island. The implication is that the *Ara Moai* did not impose an environment of sacred/ exclusionary space beyond the precise boundaries of its route and that contemporary and subsequent daily life abutted it. The occurrence of *manavai* complexes and structures subsequently built around and against recumbent *moai* indicated that they had lost any physical form of sanctity or, on the contrary, that after they fell or were abandoned people continued to believe that their special properties could exert some power through physical association. We also suggested that the arrangement of *moai*, *ahu* and some other features along the *Ara Moai* was not random, but designed to heighten the experience of journeying along it (LOC 2013, section 5). The results of this year's survey broadly confirm these interpretations — there is stone quarrying everywhere; one *hare paenga* literally abuts the *Ara Moai*; a rectangular *poro* structure lies parallel to it (*Figure 8*); *manavai* complexes accrete around *ahu* and there is a probable *manavai* at the foot of *moai* AMS123. As for the *moai*, heading east-west along the *Ara Moai* in the direction of Rano Raraku from Ahu Hoa Anga Vaka A Tua Poi, the first, a particularly tall example, appears to have stood in bold isolation in a flat plain (close to Ahu Oroi, it seems not to reference it at all); while its neighbour was hidden from it by the brow of a hill, just below which it was sited, so that the journeyer came upon it suddenly.

Now in addition, we can attempt a characterization of the *Ara Moai* itself. This was precluded last year by the interpretative ambiguity of the features comprising it, mostly linear hollows, which, though possibly relics of a 'road', could as plausibly be interpreted as weathering features related to the modern path (where this runs uphill) or a 19th or 20th century ranch

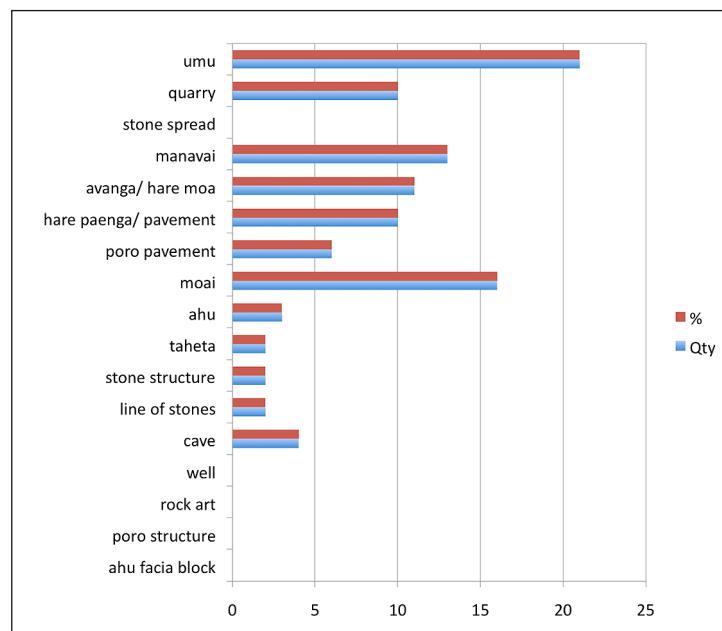
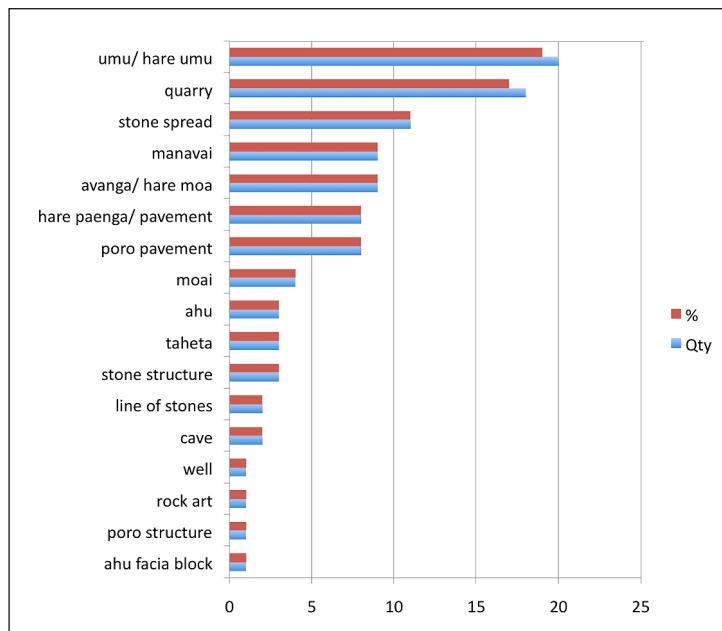


Figure 11.
The numbers and proportions of different feature types within 2014's detailed transect (top) and between Rano Raraku and Ahu Hanga Tetenga (bottom)

boundary, beside which it runs. This year, however, very similar features were recorded where there are no ranch boundaries with which they might be associated. These are discontinuous and most are on slopes, but one crosses a ridge, where it is flanked by two lines of deliberately placed stones, and in two places they continue downslope as stepped or banked features (AMS171 and AMS211) (*Figures 12 & 13*).

We can also say something of the distribution of features. Owing to the nature of the vegetation along the Hanga Tetenga-Rano Raraku transect (LOC 2013, fig. 4), we could not be sure if the distributions we observed



Figure 12.

Linear hollow marking the Ara Moai at Tuta'e (AMS144). Note the hare paenga (AMS138) sandwiched between it and manavai complex AMS137)

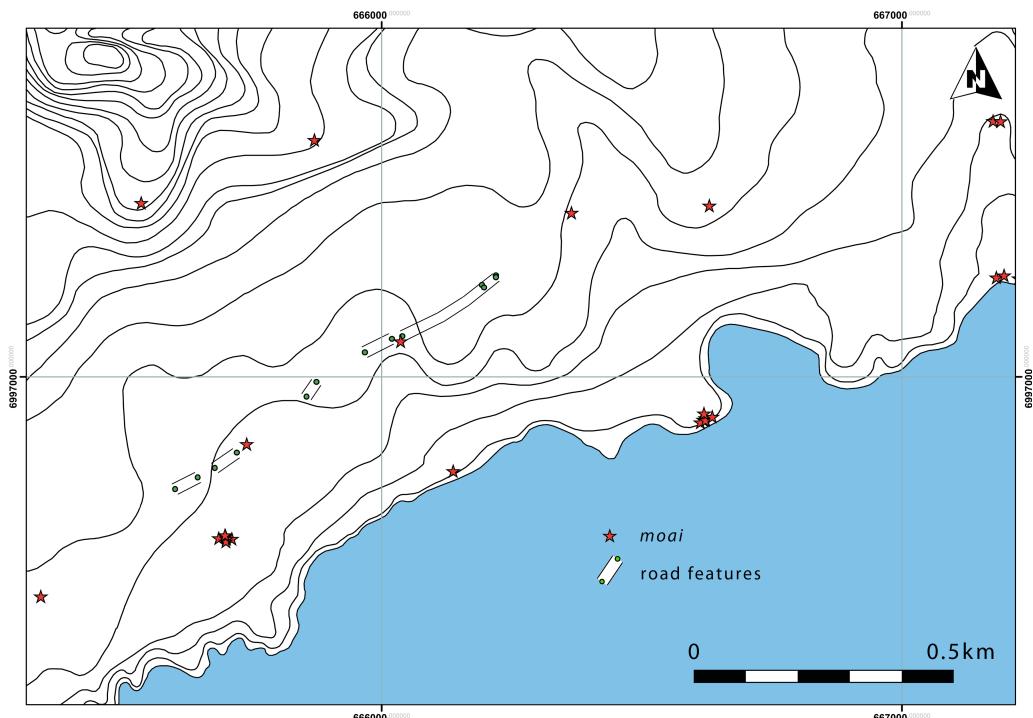


Figure 13.

'Road features' distinguishable along the Ara Moai within the part of the transect subjected to detailed survey. Further linear hollows are visible both to the east and the west

were real or not; for the Hanga Tetenga-Hoa Anga Vaka A Tua Poi transect we can. Most features within it are clustered into discrete feature complexes or sites (*Figure 14*). Typically these comprise a house (a *hare paenga*, a *hare paenga*-type pavement or an unidentified *poro* pavement), one or more *umu*, an *avanga/ hare moa* or a stone spread and sometimes a *manavai* (cf. Stevenson & Cristino 1986; Vargas *et al.* 2006). The distance between these varies. Sometimes they are close but a gap of a hundred metres or more between them is usual. (The different extent to which different complexes have been stripped might suggest that they are not contemporaneous, and the gap between functioning sites was wider still). They occur both on high points (AMS182-AMS186) and low points (e.g. AMS133-AMS135) in the landscape, but where available high points were favoured. These widely spaced inland distributions, and the differential survival of the features comprising them can usefully be compared to and contrasted with those around coastal *ahu*, at which large numbers of variably preserved *hare paenga* frequently cluster.

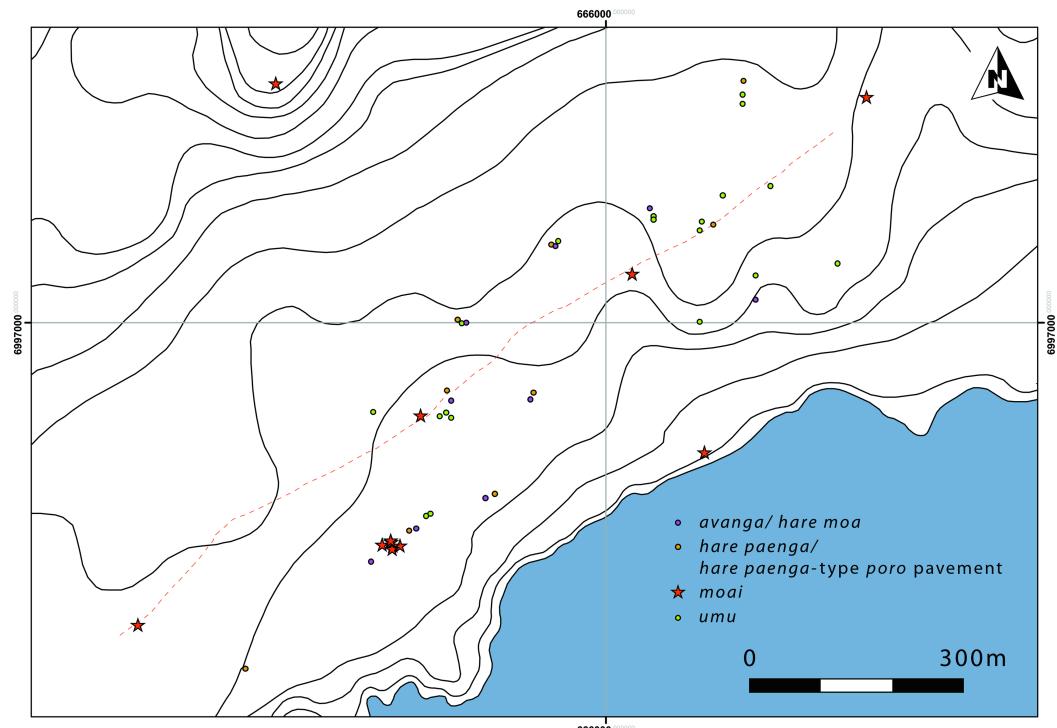


Figure 14.
The distribution of avanga/ hare moa, hare paenga and hare paenga-type pavements and umu within the part of the transect subjected to detailed survey. Most fall into discrete feature complexes or sites

Surveyors: Sue Hamilton, Julio Haoa Avaka, Mike Seager Thomas & Ruth Whitehouse

Photography: Mike Seager Thomas & Adam Stanford

3. Geophysical survey

The aim of the geophysical survey (see Welham & Steele, below: *Appendix 3*) was to investigate any sub-surface evidence for the *Ara Moai* and determine

if this could be used to identify its route where this is not visible at the surface. Three areas were surveyed: one at the western end of the detailed survey (which took in *moai* AMS125 and followed one of the aforementioned lynchet-like features: AMS211), one in the middle (which took in the other lynchet-like feature: AMS171) and one at its eastern end (straddling the linear hollow flanked by two lines of stones: AMS141-AMS144). In the first two areas, nothing of the *Ara Moai* was revealed that was not visible at the surface, but the survey did reveal an anomaly close to the base of *moai* AMS125 analogous to those previously identified at the bases of several *moai* along the *Ara Moai* using resistivity (LOC 2012, chapter 5). This was identified as a stone pad or near surface geology. The third area revealed nothing at all. This would appear to confirm observations made during Heyerdahl and Love's excavations on the *Ara Moai* (Heyerdahl 1989; Love 2001) that it is superficial.

Surveyors: Aly Keir, Charlene Steele & Kate Welham

4. *Moai* conservation and weathering survey

Introduction

The *moai* conservation and weathering survey falls into two related parts. The first focuses on the four complete eyeless *moai* (AMS120, AMS121, AMS123 and AMS125) and two *ahu*-type or eye-socketed *moai* (AMS122 and AMS124) in Rano Raraku tuff that mark or lie along the *Ara Moai* between the outer plaza of Ahu Hanga Tetenga and Ahu Hoa Anga Vaka A Tua Poi. (The torso lying close to the *Ara Moai* near to so-called Ahu Tuta'e, the red scoria head in front of Ahu Hoa Anga Vaka A Tua Poi, and a complete supine *ahu*-type *moai* in Rano Raraku tuff just beyond it are not included). It continues the conservation monitoring survey begun last year, designed in consultation with Susana Nahoe of CONAF to elucidate the characteristics, extent and causes of the variable states of *moai* preservation along the southwestern *Ara Moai* (LOC 2013, section 6). The second is a systematization of notes made during the former survey on the differential weathering visible on the fronts of the prone *moai* examined, which can only have occurred had these been standing (the lower eyes, faces and chests, which would have been exposed on standing *moai*, were observed to be more heavily weathered than the upper eyes, the underside of the chin and the stomach/ hands, which would have been partially protected — cf. Routledge 1919, 195). It entailed the study of the same six *moai* together with nine standing and one prone *moai* at Rano Raraku, added to the survey both as a control, and in order that we might compare and contrast our work on *moai* condition on the *Ara Moai* with work on *moai* condition previously conducted by CONAF at Rano Raraku (CONAF 2012). The results of both parts of the survey and the conclusions we have drawn from them are wholly consistent with those obtained and drawn by LOC last year.

The weathering of Rano Raraku tuff

The principal threat to *moai* carved in Rano Raraku tuff is water. This dissolves the tuff's fine, glassy matrix causing the coarser stones in it to disaggregate, an effect exacerbated by: the differential expansion and contraction of the minerals comprising these when subject to heat or cold; the swelling when wetted of clays formed in the weathered rock; and

pressures caused by the build up of absorbed salt and the rooting of plants. The dissolved glass is re-deposited where the water drains out of the stone and evaporates. These processes advance at different rates in different beds within the rock, because of differences in their compositions. The result is a weak, corrugated surface down which water flows, mechanically abrading the rock, or in which it pools, and an increased surface area subject to weathering. Other ongoing threats include wind sand-blasting, animal damage and human vandalism (Charola 1997).

Method

In order to achieve a consistent, easily comparable record, during the first part of the survey features were recorded on LOC's pre-existing prompt-led *Moai Conservation Record Sheet* (Appendix 4). As last year, data recorded included:

- Overall condition (loss of sculpted features).
- Weather related damage (stone disintegration, gulling, cavities, fissures, cracks, fractures and lamination).
- Other surface features (silica re-deposition, darkening due to humidity, lichen, moss and other vegetation growth, loose seeds, bird excrement, honey comb, reddening and/ or cracking due to fire, and modern graffiti).
- Evidence of livestock damage (abrasion, smoothed or polished areas and recent breaks).

These were assessed and documented separately for each of six major surfaces on each statue: top of head, base, left side, right side, front and back. Evidence for weathering and alterations to surface features were scored on a scale of 1 to 4 as follows: 1 = none; 2 = minor (<33.3% of the visible area); 3 = medium (33.3–66.6% of the visible area); 4 = major (>66.6% of the visible area). In the case of loss of features, the score relates to assessed degree of damage: 1 = none; 2 = minor; 3 = medium; 4 = major, rather than the percent of area covered by damage.

We also recorded factors that can affect the causes of, speed and severity of weathering and damage patterns.

- Their position in the landscape (on a hill or in a valley, inland or by the sea, fenced-in or open, easy to access or not).
- Whether they were intact or broken into pieces.
- Their position on the ground (prone, supine, on left side or on right side).
- The orientation of the tuff's bedding planes.

In addition multiple high-resolution photographs of each *moai* were taken to visually record the current condition and create 3-D models of the 6 *moai* (Figure 15; digital appendices 7 & 8) (cf. LOC 2013, fig. 18).

Later the data recorded on *Moai Conservation Record Sheets* was transferred to an *Excel* worksheet that can be questioned to isolate patterns



Figure 15.
Moai AMS123

of deterioration, and levels of vulnerability. The photographs and datasheets, all of which can be cross-referenced using their unique feature number, are stored digitally and appended as digital appendices to this report (*Digital appendices 3–5*). These can be directly compared to the data generated last year and if this monitoring exercise is repeated — at, for example, 5-year intervals — direct comparisons of any changes that occur in their condition will be possible.

For the second part of the survey a new *Weathering on the Fronts of Moai Record Sheet* was designed (*Appendix 5; digital appendix 6*). This records the position of the *moai*, and for the right and left front, the degree of weathering of the forehead, upper eye, lower eye, cheeks/ face, lower chin and upper neck, chest and lower stomach/ hands. Where visible the lower nose was also looked at. In all cases the degree of weathering was assessed as: not visible, light (corresponding to 1–2 above), moderate (corresponding to 3 above) or heavy (corresponding to major above). Along the *Ara Moai* the survey was conducted on prone and supine *moai*.

The same data were then recorded for nine standing (and one prone) *moai* at Rano Raraku in order to check whether the inference that differential weathering profiles observed on the lower surfaces of recumbent *moai* along the *Ara Moai* had developed while these were standing held good for *moai* that were in fact standing.

Issues

In assessing *moai* weathering we were faced with four major difficulties. The first of these was the inviolability of *moai*. Because of this we had to rely upon purely visual assessment. This is a blunt instrument. The survey team could agree on the difference between light, moderate and heavy weathering, for example, but greater subtlety was difficult to achieve and impossible to express in a way that would allow others to assess and use our work. For the first part of the survey, we solved the problem by taking multiple high-resolution photographs, which can be used for direct visual comparison, both with the *moai* and photographs taken in the future, and for the second part, by noting *relative* differences between the weathering of parts of individual *moai* that otherwise fell into the same weathering category. The second is visibility. Parts of *moai* are buried, obscured by vegetation, or, because of their height or shape, difficult to see. Also problematical are differences in the resistance to weathering of different facies of Rano Raraku tuff, in the conditions where the *moai* were set up and/or abandoned, and related to their position and the orientation of the bedding within them. It is easy enough to compare relative and absolute differences in weathering on individual *moai* and relative differences in weathering across groups of *moai*, but it is very difficult to compare absolute differences in weathering across groups of *moai*. This latter prevents us stating with confidence, for example, that prone *moai* AMS107, which has an unweathered front fell earlier than prone *moai* AMS125, which has a weathered front. Finally, disaggregated stone (and some other evidence of weathering), though remaining on the upper surfaces of *moai* falls off their vertical and downward facing parts so that the record for these areas is not comparable. For any future survey these categories need to be revised.

Results

All of the *moai* along the Ahu Tetenga–Ahu Hoa Anga Vaka A Tua Poi section of the *Ara Moai* are open to the elements and subject to ongoing climate

related chemical and physical weathering. It is worth noting, however, that the condition of AMS123, which was photographed by the Routledge team (Routledge 1919, fig. 75), has not deteriorated noticeably in a hundred years. This should probably be attributed to its position in the lee of a hill. None is close to the road but AMS120 and AMS121 are easily accessible from it and vulnerable to human activity. All have been rubbed up against by animals. The most common weathering feature is gulling, caused by the differential weathering of the layers comprising the tuff, and it is associated with the greatest loss of features. Exposure to sedimentation and marine spray do not appear to be particularly problematic, even on AMS120 and AMS121, which are closest to the sea. Potentially destructive lichen growth is widespread and the downward sides of all six have white silica deposits, which for prone statues can obscure delicate but otherwise well-preserved features such as the hands and belt.



Figure 16.

The differential weathering of the left upper and lower eye of moai AMS120. This could only have occurred had the moai been standing

Of the 20 recumbent road *moai* now examined between Rano Raraku and Ahu Hoa Anga Vaka A Tua Poi, 16 (15 prone *moai* and one supine *moai*) show unequivocal evidence in the form of differential weathering on their fronts that they had formerly been standing (Figure 16). Of these 12 were more heavily weathered on the right side and one more heavily weathered on the left, an observation consistent with the view that they were facing down the road away from Rano Raraku with their right fronts towards the prevailing northwesterly wind. The un- or less weathered parts are the upper eye and the lower chin/ upper neck and the stomach, which are mostly lightly or moderately weathered. The more weathered parts, the lower eye/ face and the chest, are mostly moderately or heavily weathered. The same trend of difference was seen on the 10 *moai* examined at Rano Raraku.¹ Despite the

¹ Nos 002-143, 002-049, 002-050, 002-051, 002-063, 002-066, 002-079, 002-077, 002-086 and 002-089

fact that nine remain standing, the weathering of most of these is less pronounced than that on the fronts of those examined along the route of the *Ara Moai*, with none of those examined falling into the heavily weathered category. Nonetheless the evidence is clear. On a standing *moai*, those parts of it that are vertical or face upwards are more heavily weathered than those that face downwards.

Comparison of LOC's moai conservation and monitoring survey along the Ara Moai with a similar survey conducted by CONAF at Rano Raraku

Finally, working at Rano Raraku and along the *Ara Moai* provided an opportunity for us to compare and contrast our conservation and monitoring survey with work on *moai* condition previously conducted by *CONAF* at Rano Raraku (2012).

Designed in consultation with *CONAF*, the methodology applied during our conservation and monitoring survey — particularly in terms of the variables recorded — is similar, the main difference being our separation of *moai* into major surfaces and *CONAF*'s treatment of each *moai* as a whole. Our method is more detailed; *CONAF*'s, however, avoids the difficulty we encountered in comparing the record for different parts of individual *moai*. Nonetheless it remains our view that disaggregated stone is the wrong thing to record (see *Issues* above). We suggest instead recording stone matrix removal. As far as the *moai* themselves are concerned, our primary observation is the different preservation of those examined by us at Rano Raraku and those along the *Ara Moai*, which we attribute primarily to their position in the landscape: protected at Rano Raraku by the volcano and unprotected on the *Ara Moai*. This latter observation has major implications in terms of the future conservation of *moai*.

The method adopted by us for our survey of the weathering on the fronts of *moai* was designed to answer a particular interpretative question. The work previously conducted by *CONAF* did not inform our survey in any way; nor did our work contribute to *CONAF*'s.

*

Note: owing to Rano Raraku's cultural sensitivity, work there was conducted out of park hours in the company and with the assistance of *CONAF* ranger, Julio Haoa Avaka.

Surveyors: Sue Hamilton, Julio Haoa Avaka, Mike Seager Thomas & Ruth Whitehouse.

Photography: Mike Seager Thomas & Adam Stanford

5. Suggestions for future fieldwork

While the fieldwork presented here largely fulfilled the objectives outlined in the introduction to this report, it nonetheless raised some possibilities for future fieldwork on, and related to the southwest *Ara Moai*. These are:

- Walkover survey. Further detailed study of site feature morphology and condition could help identify which sites were occupied last, and so inform our understanding of site distribution. It would also be worthwhile comparing these distributions and the differential survival of the

features comprising them with that of clusters of *hare paenga* in the vicinity of coastal *ahu*.

- Landscape phenomenology. On the Rano Raraku-Ahu Hanga Tetenga section of the *Ara Moai*, we conducted a preliminary survey of the topographic contexts and changing visibility of *moai* from the perspective of someone journeying east along it. No attempt was made to continue this survey on the section of the *Ara Moai* between the outer plaza of Ahu Hanga Tetenga and Hoa Anga Vaka A Tua Poi. Nonetheless the apparently non-random arrangement of *moai* continued to strike us, informing our interpretation. It is our view therefore that it would be worth reviving and developing this part of the survey.
- Geophysics. Earth resistivity might detect compaction of the ground along the route of the *Ara Moai*, not detectable using the electromagnetic and fluxgate gradiometer techniques employed on it by us to date.
- Excavation. Having proved that the *moai* along *Ara Moai* were upstanding but with the reason for and context of this still uncertain, we once again raise the possibility of excavation to the rear of one or more of them. The geophysical anomalies to their rears could be a variety of things (geology, garden features, animal scuffs, compaction); but they could also be deliberately constructed platforms. Excavation would clarify this and possibly answer the foregoing question.

6. Recommendations to CONAF for the future conservation and presentation of the *Ara Moai*

Our recommendations to CONAF for the ongoing conservation and future presentation of the *Ara Moai* and the *moai* and other archaeological features along it are, for the most part, unchanged from last year (LOC 2013, sections 8-11). For the stretch of the *Ara Moai* between the outer plaza of Ahu Hanga Tetenga and Hoa Anga Vaka A Tua Poi, they are summarized below.

Conservation

- The evidence for animals rubbing against the *moai* on the *Ara Moai* is clear. We also spotted artefacts near and human remains under *moai* AMS121, which could easily be picked up by souvenir hunters (*Figure 17*). Currently a fence encloses AMS121 and adjacent AMS120 but this is broken. From the point of view of their preservation, this latter fence should be repaired and the remaining unenclosed *moai* fenced in.
- Lichen growth is obscuring features on several of the *moai* and represents an ongoing threat to their surface integrity: its treatment should be considered.

- In order to assess the deterioration of the *moai*, and the differing threats to which individual *moai* are subject, monitoring should be carried out on a regular basis (perhaps every 5 years) — this would involve both the completion of Moai *Conservation Record Sheets* and the repetition of our 3-D photographic survey. This would enable CONAF to assess the relative threat to, and the conservation priorities for, individual *moai*. AMS123, for example, appears already to be partially protected from the elements by its position in the lee of a hill, but spoil propping it is eroding away and it remains vulnerable to animal damage.



Figure 17.

Human cranium beneath moai AMS121. Moai AMS121 is easily accessible from the road and the fence surrounding it is broken

- Some thought should be given to the preservation of other categories of feature along the *Ara Moai*. The *poro* structure at Tuta'e (AMS152), for example, and the well (AMS181) are both rare types, and though not currently at risk, could become so were they to be incorporated within the proposed trekking trail. We would also note the vulnerability to animal disturbance of the surface-set pavements of boat-shaped houses (e.g. AMS179).
- The proposed trekking trail need not and should not follow the entire possible route of the *Ara Moai*, which itself requires protection as an archaeological monument. The trail's limits should be clearly defined in order to prevent visitors from wandering into, and causing damage to, the wider archaeological landscape.

For the *Moai Conservation Survey* along the route of the *Ara Moai* as a whole, we also recommend minor changes to the data recorded, specifically the aforementioned shift from disaggregated stone to stone matrix removal as an indicator of weathering. We would also like to see more attention placed upon the differences in Rano Raraku tuff, and the implications of these for differential *moai* survival.

Presentation

- An *Ara Moai* tourist trekking trail should be designed as a way of providing access to both the ritual and the domestic archaeology associated with it. For the best experience, sites along it should remain unenclosed; clearly however this desire has to be balanced with the needs of conservation outlined above. Such a route, which would take at least a day to walk, would encourage visitors to spend more time on the Island.
- The trail should be designed and sign-posted to allow starting at either end.
- Stopping/ information points along the route should be isolated. Stopping points should be at places where there are easily understandable associated archaeological features/ feature complexes and where the wider landscape of the route can best be understood. For the stretch of the *Ara Moai* between the outer plaza of Ahu Hanga Tetenga and Hoa Anga Vaka A Tua Poi these should include the Tuta'e complex (AMS137, AMS138, AMS144, AMS152 etc.). The presentation of these — aided by an illustrated trekking leaflet, which could be retained by visitors as a souvenir — would enhance an understanding of a wide range of Rapa Nui's prehistoric structures, give a more rounded picture of the archaeology of the island and provide further variety and interest to walkers. Further locations might be identified by the phenomenological survey suggested above.
- Well-preserved recumbent *moai*, especially those with readily understandable associated archaeological features should also be highlighted stopping points. AMS123 and AMS125 are additionally recommended because of their appearance in Routledge's seminal *The Mystery of Easter Island* and AMS125 because of its popular association with Captain Cook.
- Fence off AMS181, which is deep and dangerous.

7. Conclusion

The writing and translation of this report marks the end of LOC's 2014 *Ara Moai* survey. We have now conducted detailed survey on more than 3 kilometres of the *Ara Moai* and found, described and geolocated 243 archaeological features, including 20 eyeless *moai*. The survey has contributed to the understanding of the *Ara Moai* and its wider

archaeological context and the database it has generated, and made available in a widely accessible form, will be of long-term use to CONAF, for conservation and heritage management, and to future researchers into the route and meaning of the *Ara Moai*. For CONAF as the custodian and manager of the park, it is a success, since an informed management strategy for the stretch of the *Ara Moai* between Rano Raraku and Ahu Hoa Anga Vaka A Tua Poi is now possible. For us as researchers it is also a success: questions relevant to the understanding of prehistoric Rapa Nui have been answered. Was the *Ara Moai* a defined linear way? Yes. Were the *moai* along it standing? Yes. Was the landscape through which it ran exclusive? No. Is the distribution of archaeology within this random? No. It has also refined how, and suggested new ways in which, *moai* can be analyzed and recorded, which will be of use to a range of stakeholders. It remains to be seen, however, whether the long term needs of the archaeologist, the conservator and the tourist journeying along the *Ara Moai* can be reconciled.

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Appendix 1. 2014 Ara Moai Survey Feature List

Unique Feature Code	Feature Type	Englert number	Atlas number	Easting	Northing
AMS118	ahu	none	unknown	665951	6997472
AMS119	ahu	none	12-369	665541	6997333
AMS120	moai	none	12-13	667183	6997478
AMS121	moai	none	12-14	667175	6997490
AMS122	moai	none	12-172	666632	6997327
AMS123	moai	none	12-220	666371	6997317
AMS124	moai	none	12-255	666035	6997066
AMS125	moai	none	12-397	665714	6996851
AMS126	umu	none	unknown	666231	6997191
AMS127	stone spread	none	unknown	666301	6997258
AMS128	ahu	none	unknown	666352	6997115
AMS129	manavai complex	none	unknown	666352	6997115
AMS130	umu	none	unknown	666325	6997083
AMS131	stone spread	none	unknown	666231	6997179
AMS132	minor quarry	none	unknown	666202	6997108
AMS133	umu	none	unknown	666210	6997066
AMS134	avanga/hare moa	none	unknown	666210	6997032
AMS135	manavai complex	none	unknown	666198	6997096
AMS136	umu	none	unknown	666164	6997178
AMS137	manavai complex	none	12-143	666165	6997121
AMS138	hare paenga	none	unknown	666151	6997137
AMS139	umu	none	unknown	666132	6997129
AMS140	umu	none	unknown	666135	6997141
AMS141	road feature	none	unknown	666193	6997177
AMS142	road feature	none	unknown	666197	6997172
AMS143	road feature	none	unknown	666220	6997195
AMS144	road feature	none	12-242	666220	6997192
				666040	6997078
AMS145	minor quarry	none	unknown	666242	6997307
AMS146	stone spread	none	unknown	666202	6997311
AMS147	hare paenga-type poro pavement	none	unknown	666193	6997338
AMS148	umu	none	unknown	666192	6997306
AMS149	umu	none	unknown	666192	6997319
AMS150	stone spread	none	unknown	666181	6997273

Unique Feature Code	Feature Type	Englert number	Atlas number	Easting	Northing
AMS151	poro pavement	none	unknown	666187	6997264
AMS152	poro structure	none	12-240	666149	6997163
AMS153	moai	none	unknown	666162	6997164
AMS154	poro pavement	none	unknown	666144	6997159
AMS155	taheta	none	unknown	666118	6997201
AMS156	minor quarry	none	unknown	666080	6997176
AMS157	manavai	none	?12-256	666084	6997190
AMS158	poro pavement	none	unknown	666077	6997171
AMS159	avanga/hare moa	none	unknown	666062	6997160
AMS160	umu	none	unknown	666067	6997149
AMS161	umu	none	unknown	666067	6997144
AMS162	poro pavement	none	unknown	666140	6997010
AMS163	umu	none	?12-252	666132	6997001
AMS164	minor quarry	none	unknown	665968	6996936
AMS165	stone spread	none	unknown	666140	6997010
AMS166	taheta	none	unknown	666140	6997010
AMS167	minor quarry	none	unknown	666117	6997092
AMS168	obsidian scatter	none	none	665905	6996891
AMS169	ahu	none	12-255	666035	6997073
AMS170	stone spread	none	unknown	666060	6997024
AMS171	road feature	none	none	666020	6997073
				665968	6997047
AMS172	umu	none	unknown	665934	6997114
AMS173	hare paenga-type poro pavement	none	unknown	665924	6997109
AMS174	avanga/hare moa	none	unknown	665930	6997107
AMS175	cave	none	unknown	665925	6997102
AMS176	minor quarry	none	unknown	665940	6997083
AMS177	obsidian scatter	none	none	665968	6996936
AMS178	umu	none	unknown	665799	6996999
AMS179	hare paenga	none	unknown	665793	6997004
AMS180	avanga/hare moa	none	unknown	665805	6997000
AMS181	well	none	unknown	665806	6996980

Unique Feature Code	Feature Type	Englert number	Atlas number	Easting	Northing
AMS182	hare paenga-type poro pavement	none	?12-395	665899	6996902
AMS183	poro pavement	none	unknown	665900	6996899
AMS184	manavai	none	unknown	665905	6996891
AMS185	avanga/hare moa	none	unknown	665895	6996893
AMS186	circular structure	none	unknown	665885	6996896
AMS187	road feature	none	unknown	665875	6996990
				665856	6996962
AMS188	hare paenga-type poro pavement	none	?12-396	665778	6996905
AMS189	poro pavement	none	unknown	665770	6996903
AMS190	avanga/hare moa	none	?12-396	665784	6996891
AMS191	stone structure	none	unknown	665779	6996890
AMS192	poro pavement	none	unknown	665712	6996895
AMS193	stone spread	none	unknown	665724	6996887
AMS194	manavai	none	unknown	665734	6996984
AMS195	stone spread	none	unknown	665753	6996988
AMS196	minor quarry	none	unknown	665734	6996997
AMS197	manavai complex	none	unknown	665681	6996927
AMS198	stone spread	none	unknown	665676	6996870
AMS199	umu	none	unknown	665675	6996875
AMS200	minor quarry	none	unknown	665665	6996944
AMS201	umu	none	?12-396	665784	6996867
AMS202	umu	none	unknown	665777	6996874
AMS203	umu	none	?12-396	665768	6996869
AMS204	hare paenga	none	unknown	665845	6996761
AMS205	avanga/hare moa	none	unknown	665832	6996755
AMS206	minor quarry	none	unknown	665792	6996825
AMS207	umu	none	unknown	665755	6996733
AMS208	hare paenga	none	unknown	665725	6996709
AMS209	ahu	199	12-460	665773	6996623
AMS210	manavai complex	199	12-460	665697	6996681

Unique Feature Code	Feature Type	Englert number	Atlas number	Easting	Northing
AMS211	road feature	none	none	665722	6996854
				665681	6996829
AMS212	avanga/hare moa	none	unknown	665735	6996712
AMS213	avanga/hare moa	none	unknown	665672	6996666
AMS214	stone spread	none	unknown	665630	6996661
AMS215	minor quarry	none	unknown	665628	6996703
AMS216	stone structure	none	unknown	665620	6996709
AMS217	minor quarry	none	unknown	665617	6996669
AMS218	stone structure	none	unknown	665613	6996663
AMS219	cave	none	unknown	665616	6996662
AMS220	taheta	none	unknown	665619	6996660
AMS221	minor quarry	none	unknown	665654	6996700
AMS222	road feature	none	none	665652	6996812
				665603	6996785
AMS223	stone spread	none	unknown	665578	6996865
AMS224	umu	none	unknown	665749	6996730
AMS225	line of stones	none	unknown	665593	6996843
AMS226	manavai	none	unknown	665619	6996876
AMS227	poro pavement	none	unknown	666352	6997115
AMS228	minor quarry	none	unknown	666202	6997311
AMS229	ahu facia block	none	unknown	666172	6997105
AMS230	minor quarry	none	unknown	666118	6997201
AMS231	obsidian scatter	none	none	666080	6997176
AMS232	minor quarry	none	unknown	665685	6996977
AMS233	minor quarry	none	unknown	665660	6996905
AMS234	minor quarry	none	unknown	665664	6996858
AMS235	obsidian scatter	none	none	665792	6996825
AMS236	obsidian scatter	none	none	665617	6996669
AMS237	minor quarry	none	unknown	665578	6996865
AMS238	line of stones	none	unknown	665616	6996662
AMS239	obsidian	none	unknown	665654	6996700

Unique Feature Code	Feature Type	Englert number	Atlas number	Easting	Northing
	scatter				
AMS240	rock art	none	unknown	667175	6997490
AMS241	ahu	201	unknown	665521	6996443
AMS242	moai	none	unknown	665428	6996582
AMS243	hare paenga	none	unknown	665496	6996516

Appendix 2. Ara Moai Survey Feature Record Sheet

LOC — PRELIMINARY WALKOVER SURVEY RECORD SHEET

1. Feature No:	2. Site Name:	2. Associated Feature N ^{o(s)} :		
3. Feature type:				
4. Previously noted (tick)	Hunt:	Atlas:	Shepardson:	Other:
5. Easting		Northing		
6. Length:	7. Width:		8. Height/ Depth:	
9. Photo N ^{o(s)} (yes/no):				
10. Land use:		11. Physical Relationships:		
12. Description/ Interpretation:				
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>				
13. Sketch:				
				
14. Significance (<i>justify</i>):				
<hr/> <hr/>				
15. Visibility:	16. Date:		17. Initials:	
Page 1 of 2				

Feature no:

18. Additional Comments:

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Appendix 3. Geophysical Survey on the Southern Ara Moai, January–February 2014

by Kate Welham & Charlene Steele

Introduction

The *Ara Moai*, or *moai* roads, are a network of tracks that originate from a common centre at Rano Raraku and spread out over the island towards the coastal *ahu* locations. Recumbent *moai* lie at intervals along them. Records from Routledge (1919), and excavations by Heyerdahl (1989) and Love (2001) have indicated that these 'roads' may be tracks at best and are likely to be shallow ephemeral features, possibly containing some compacted areas of soil. Many of the statues along the *Ara Moai* have been found to have sub-circular pads of stones near their base, on which they once would have stood (Heyerdahl 1989; LOC 2012; Love 2001; Richards *et al.* 2011). Mapping using satellite imagery techniques (Hunt 2005) has provided suggested locations for the network of *Ara Moai* across the island.

This geophysical survey was commissioned by CONAF to investigate the southern *Ara Moai* between Cook's *moai* (AMS125) and Ahu Tuta'e (AMS137) (Figure A3.1) in advance of the possible creation of a heritage trail. Geophysical survey was undertaken in 2013 on the southern *Ara Moai* between Tetenga and Rano Raraku (Welham 2013). The work forms part of a larger Level 1 survey of the area, and the aim was to determine if geophysical survey could identify evidence for the presence of the *Ara Moai* in areas where it is not easily visible on the ground.

Method

Geophysical survey was conducted at three locations along the southern *Ara Moai* (Figure A3.1). Grids for geophysical survey were located using a Leica 500 differential Global Positioning System (dGPS) and data were downloaded and processed in Leica GeoOffice v.8.0, and converted to SIRGAS2000. Plans were produced in ESRI ArcGIS v10.0 using point data exported from Leica Geo Office, and base map layers provided by CONAF. All sites were surveyed using electromagnetic techniques and a fluxgate magnetometer. All grids were 20 x 20 m.

The electromagnetic survey was conducted using a Geonics EM38B instrument in horizontal and vertical dipole modes. Readings were taken at 1 m intervals along north-south traverses spaced 1m apart. Data were accessed in Geonics DAT software. Survey in 2013 (Welham 2013) had indicated that improved results were seen using horizontal mode, as the *ara* remains are likely to be at a shallow depth. Horizontal mode was used as standard, with the exception of the area south of an un-named *ahu* where Love (2001) had recorded deeper deposits and therefore a vertical mode was used.

Fluxgate gradiometer survey was conducted using a Bartington Grad601b with readings taken at 0.125 m intervals along north-south traverses spaced 1m apart, at a resolution of 1nT, readings were taken in parallel. All data were subjected to minimal processing (e.g. despike, zero mean traverse, and clip) in Archeosurveyor v2.5, and imported into ArcGIS v10.0 for display and production of interpretation plots. The data are presented in Figures 2–4.

Results

Cook's Moai (AMS125)

This site was selected due to the presence of a visible depression (AMS222) and corresponding trackway on a slope to the southwest of Cook's *moai* (AMS125), near Ahu Oroi (AMS209). The trackway/ putative *Ara Moai* appears to run northeast — southwest towards Cook's *moai*, where it can no longer be seen. Electromagnetic survey in horizontal mode and fluxgate magnetometer survey were conducted, and the results are presented in *Figure A3.2*.

A linear anomaly is clearly visible in the fluxgate magnetometer data which mirrors the trackway running towards Cook's *moai*. Approximately 10 m southwest of the recumbent *moai* the anomaly appears to divide in two and pass either side of it. This is likely to be a response to a modern trackway. It is possible that the course of the *Ara Moai* can be seen to the northeast of the *moai* in the magnetic susceptibility and fluxgate magnetometry data as a very weak, linear anomaly. The position of this anomaly is in line with the course of the *Ara Moai* where it can be seen on a slope to the northeast as a hollow. The magnetic susceptibility survey also detected a high susceptibility anomaly, approximately 5 x 5 m in size, to the northeast of the *moai*. It is unclear whether this represents a stone pad behind the *moai*, or changes in the underlying geology. Neither the *Ara Moai* or the putative pad were detected in the conductivity survey.

Un-named *ahu* (AMS169)

Geophysical survey was carried out in this area due to the presence of a well defined part of the *Ara Moai* (AMS144) adjacent to an un-named *ahu* (AMS169), immediately northeast of the survey area. This area was excavated by Love (2001) in 2000 where he noted deep deposits relating to the *Ara Moai* (from photographs these appear to be ~1 m deep). Due to the apparent depth of the *ara* deposits here electromagnetic survey was conducted in vertical mode alongside a fluxgate magnetometer survey. The results can be seen in *Figure A3.3*.

The *Ara Moai* can clearly be seen in all three data sets as a linear anomaly running northeast-southwest across the survey area. It is possible that one of Love's trenches is present in the fluxgate magnetometer data as a rectangular area of weakly enhanced magnetism perpendicular to the *Ara Moai* in the northeast of the survey area.

Ahu Tuta'e (AMS137)

Survey was conducted in this area due to the presence of a complex of features including a possible *ahu* (AMS137), *hare paenga* (AMS138), a *poro* 'dancing' platform (AMS152) and a section of the *Ara Moai* with kerbing (AMS141-44). The *Ara Moai* can clearly be seen running from the un-named *ahu* to the southwest and past Ahu Tuta'e before it disappears approximately 20 m to the northeast. There is a fallen *moai* (AMS123) in an adjacent field to the northeast. Electromagnetic survey in horizontal mode, and fluxgate magnetometer survey were undertaken. The results can be seen in *Figure A3.4*.

The *Ara Moai* was not detected in the data from either technique. This area was found to have a stronger magnetic background signal than when compared to the previous two sites. The bedrock is very close to the surface and the survey was impacted by the presence of basaltic rocks. It is likely that these difficulties have impeded the effectiveness of these surveys.

Conclusion and further work

The results from this survey have demonstrated that where evidence for the *Ara Moai* can be observed in these data it is normally associated with a visible topographic feature. The only exception to this is in the area around the un-named *ahu*, where Love (2001) notes the considerable depth to the *ara* at this point.

It is thought that the nature of the *Ara Moai* is likely to be extremely ephemeral, and this would confirm the observations recorded from excavations (Heyerdahl 1989; Love 2001). It is possible that the use of a different geophysical technique may enable detection of a compacted ground surface, and therefore it is recommended that earth resistivity is conducted over a section of the areas surveyed here to examine this hypothesis. It would also be of interest to conduct earth resistivity survey over the area behind Cook's *moai* to further investigate the possible presence of a stone pad (as per Richards *et al.* 2011).

Surveyors: Kate Welham, Charlene Steele & Aly Keir

Figure A3.1.
Location of the southern Ara Moai from Ahu Oroi (AMS209) to 'Ahu' Tu Tai (AMS137)

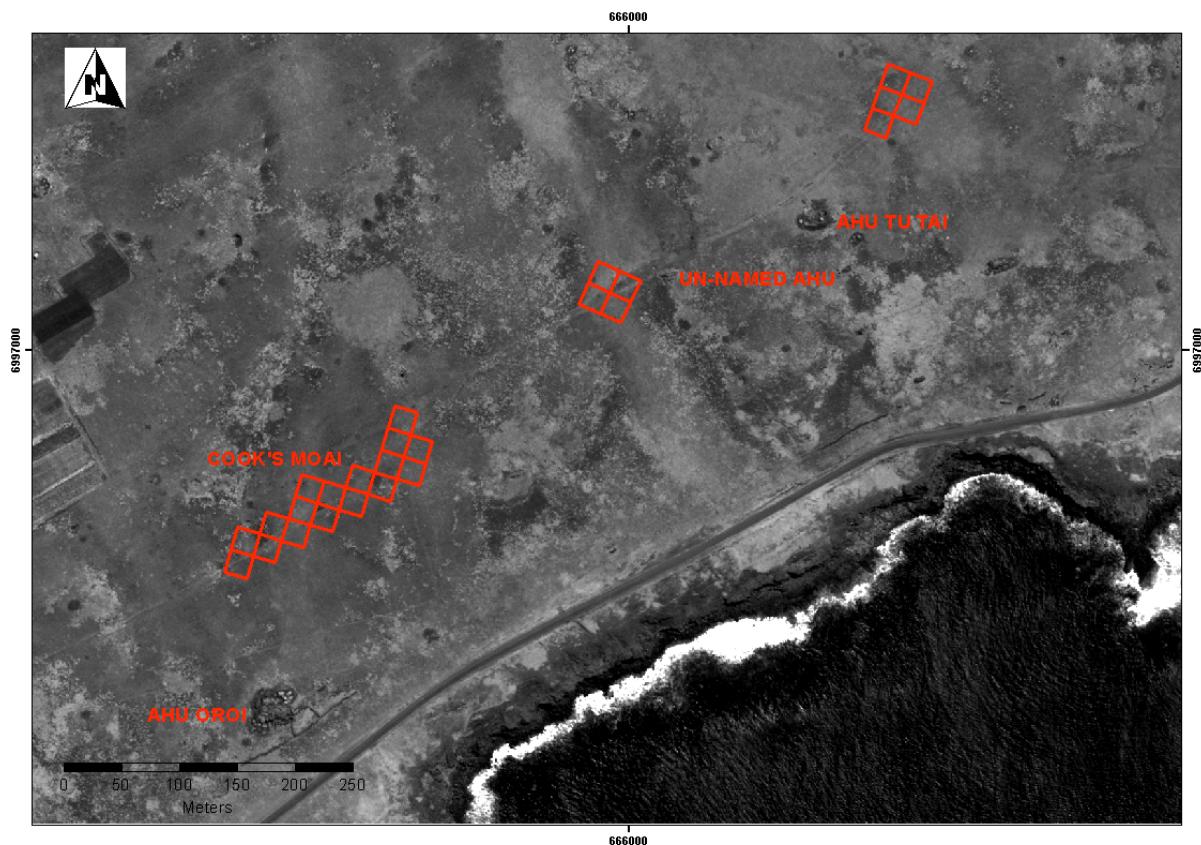
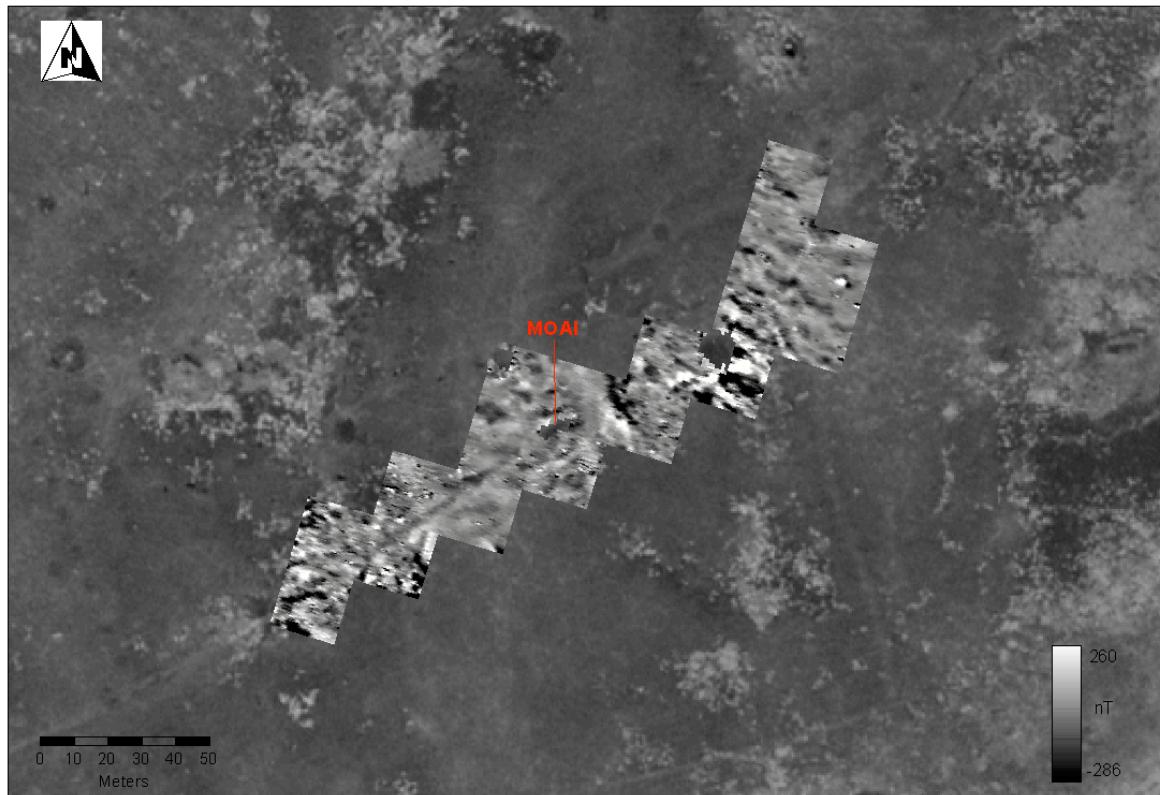
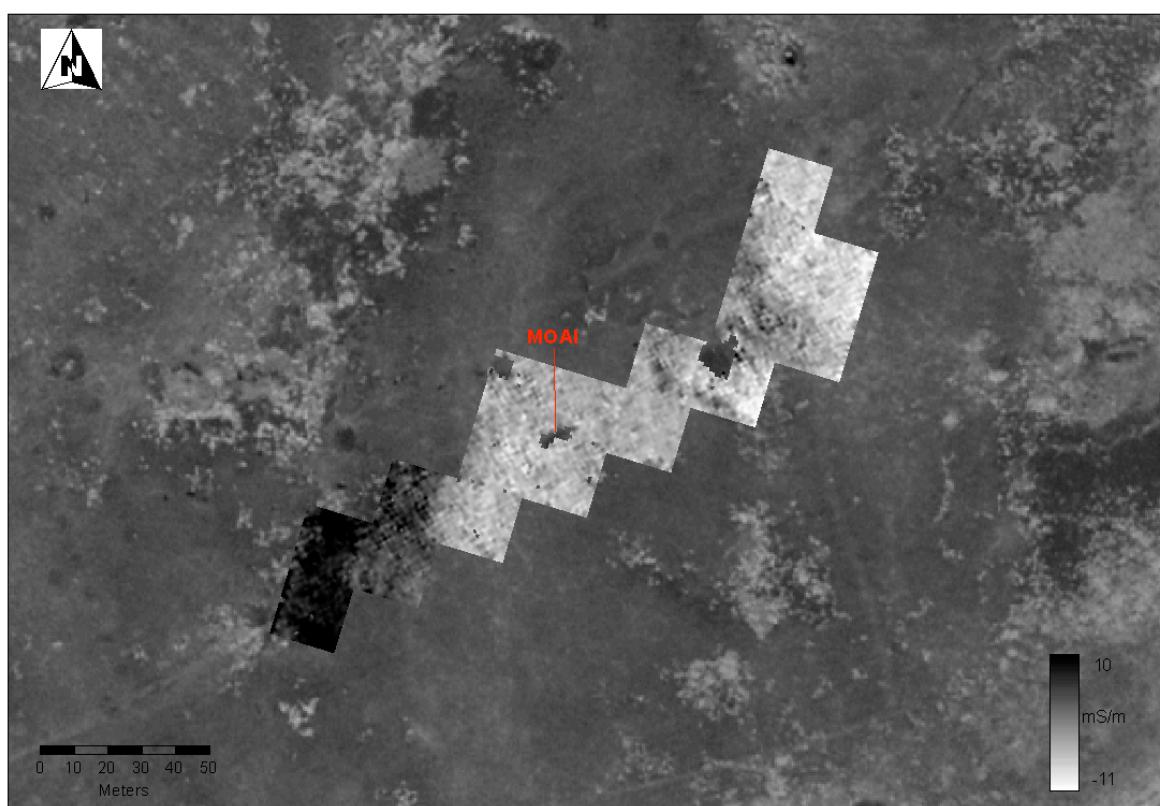


Figure A3.2.
Plots of geophysical survey data from the Ara Moai at Cook's Moai (AMS125)
A: Fluxgate magnetometer data



B: Electromagnetic survey data: conductivity (horizontal mode)



C: Electromagnetic survey data: magnetic susceptibility (horizontal mode)

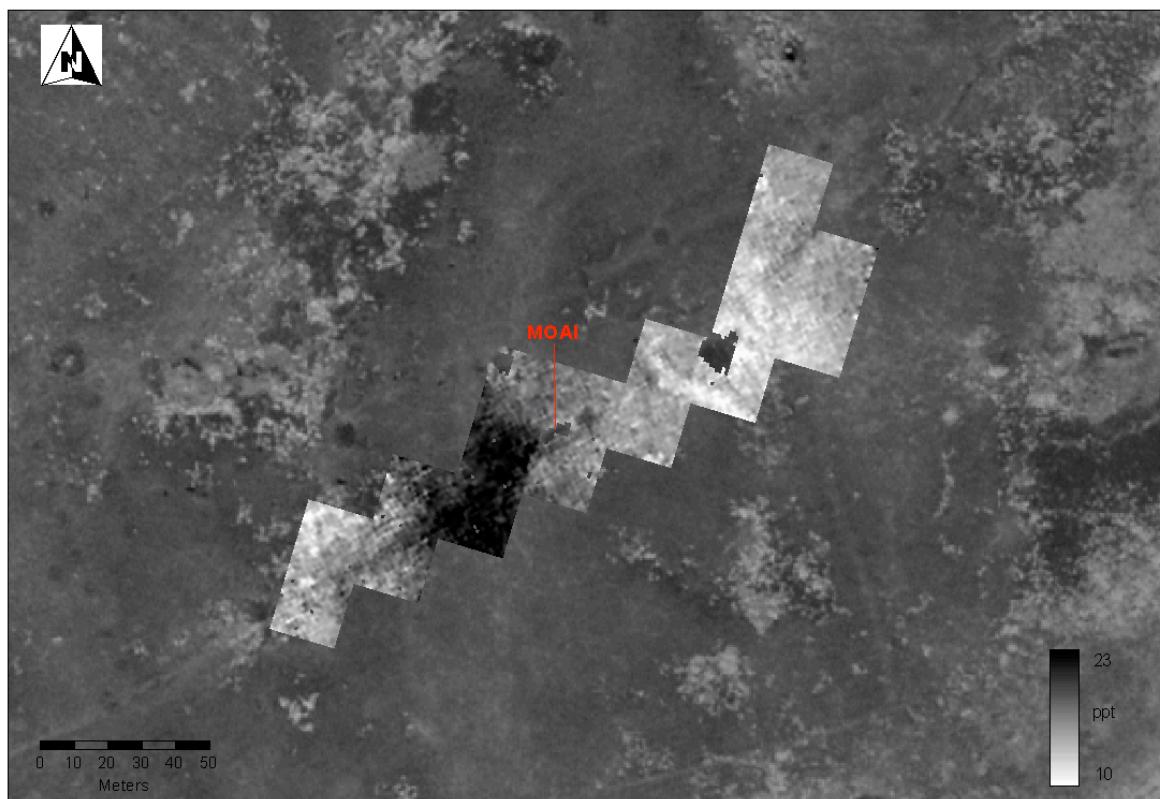
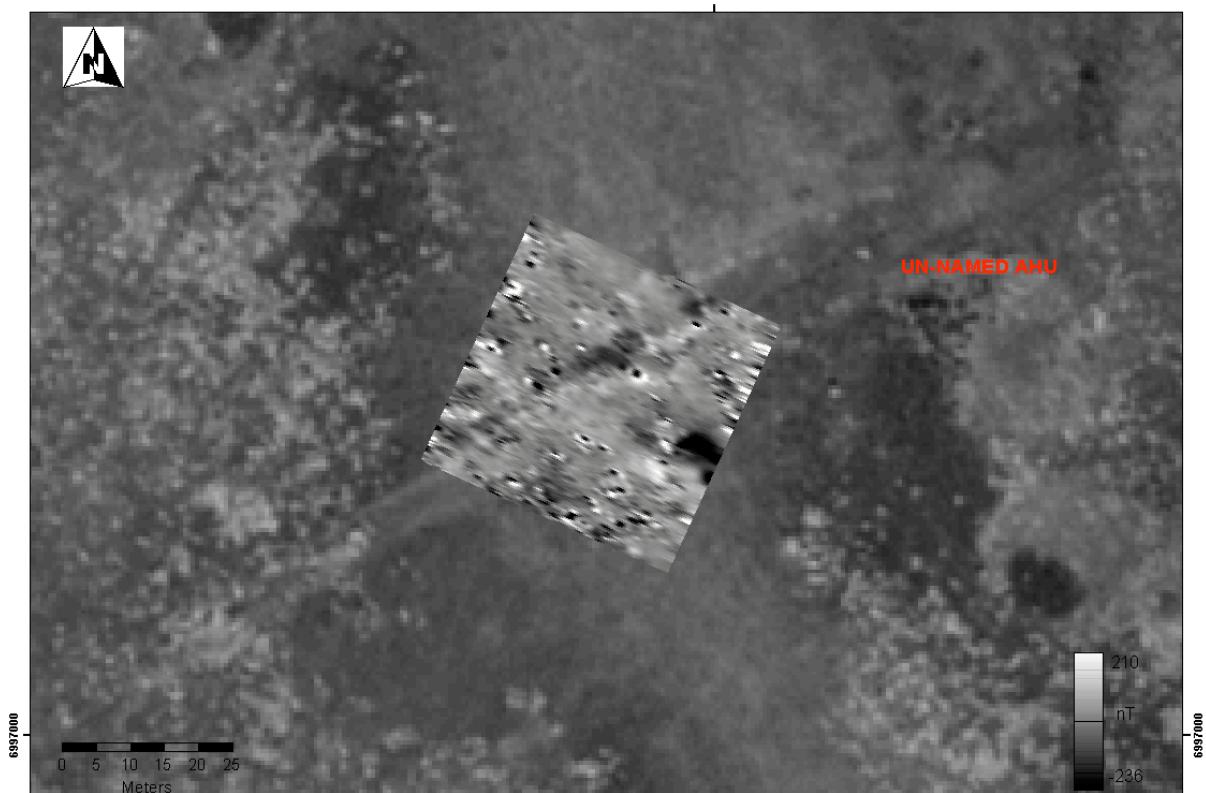
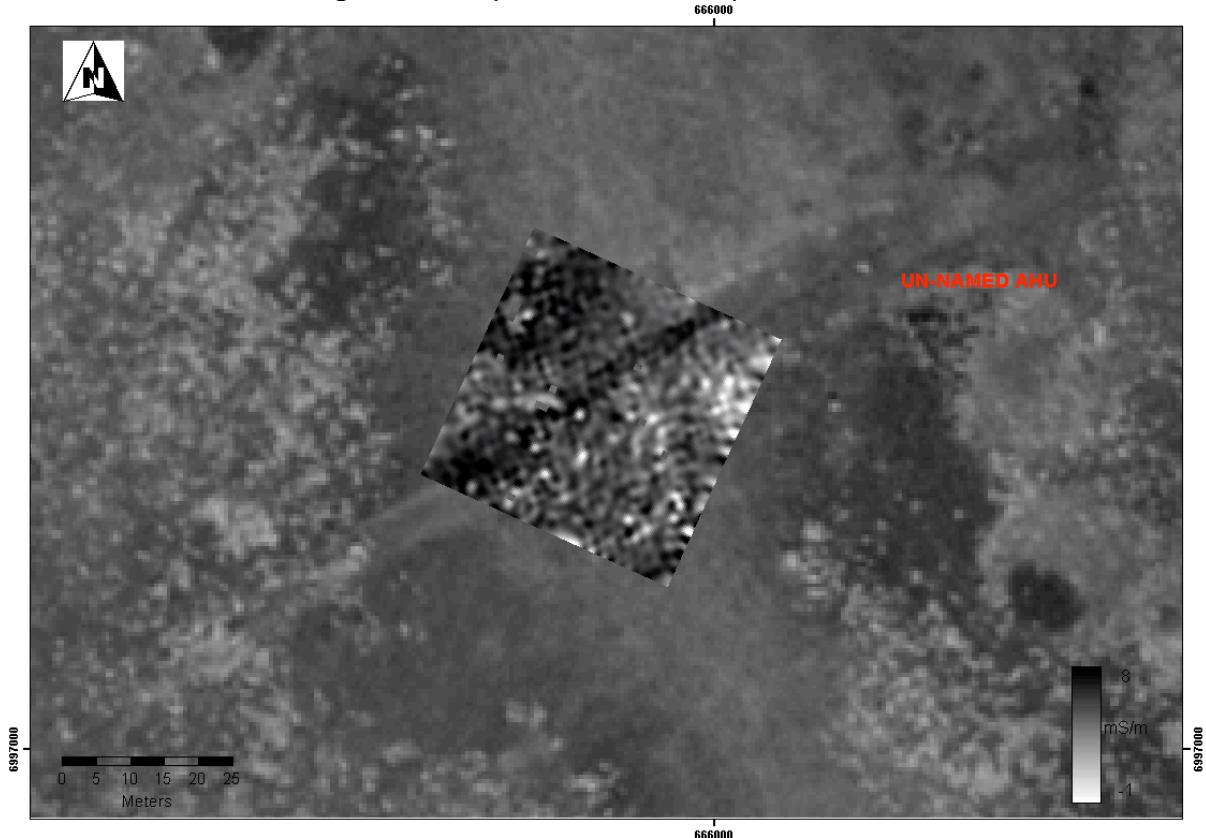


Figure A3.3.
Plots of geophysical survey data from the Ara Moai southwest of the un-named ahu
(AMS 169)

A: Fluxgate magnetometer data



B: Electromagnetic survey data: conductivity (vertical mode)



C: Electromagnetic survey data: magnetic susceptibility (vertical mode)

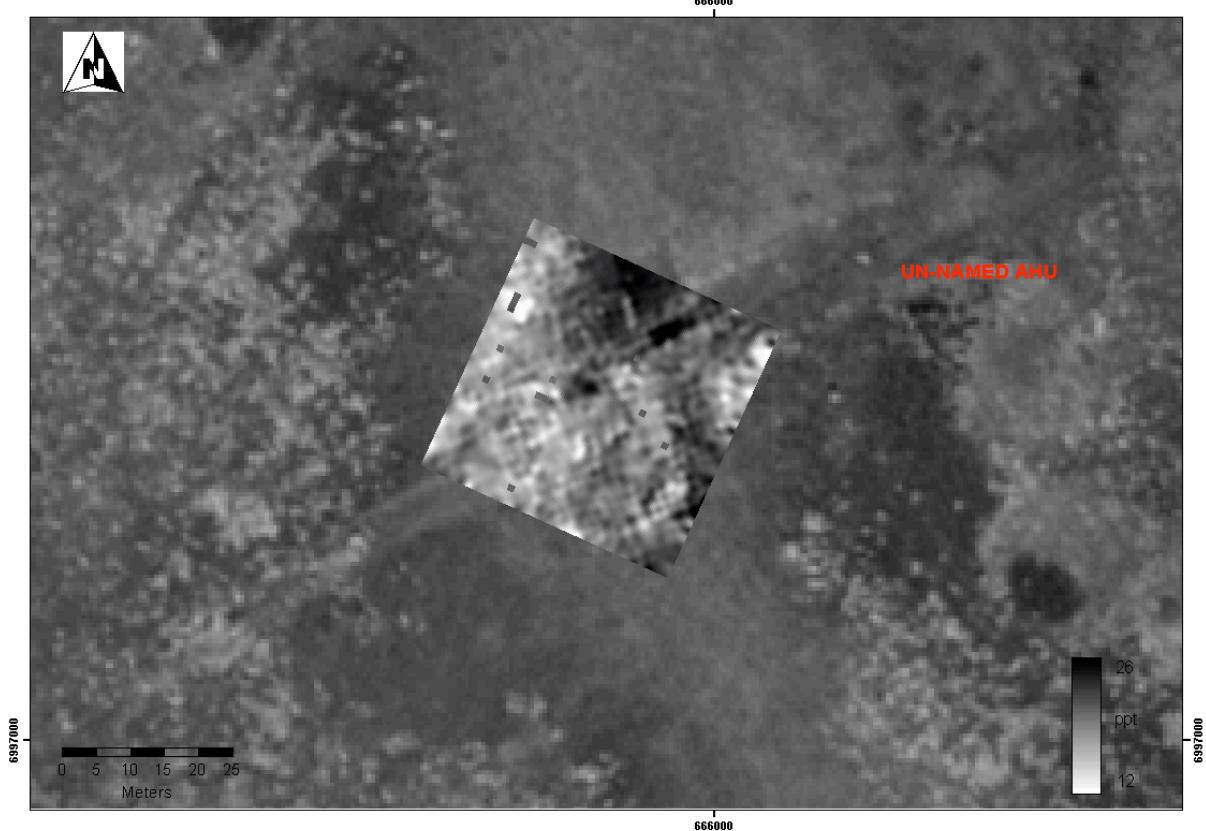
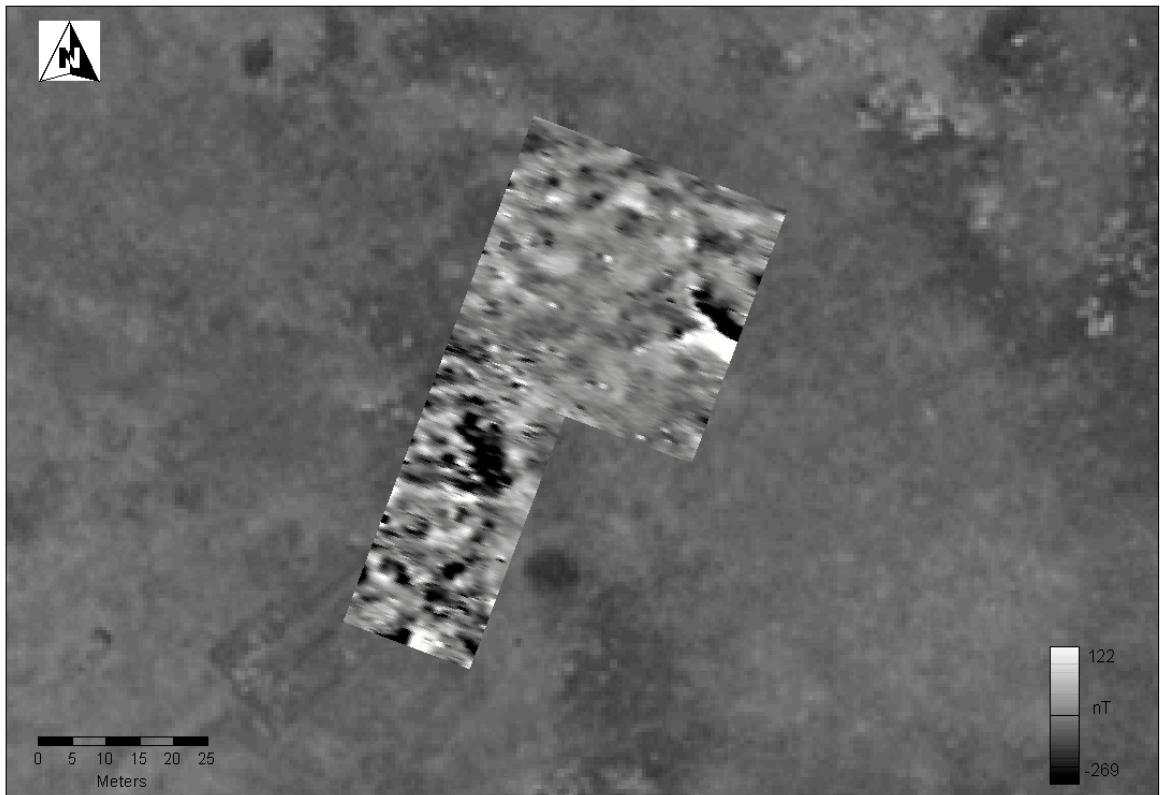
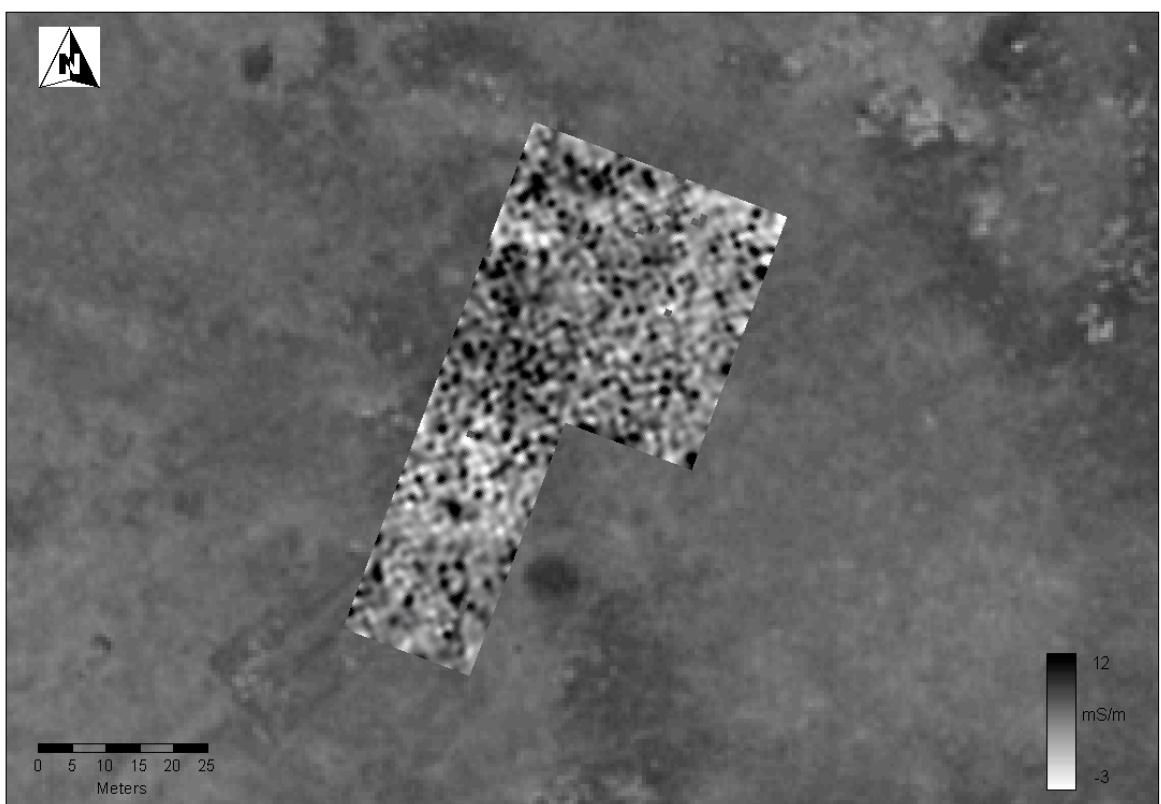


Figure A3.4.
Plots of geophysical survey data from the Ara Moai north of Ahu Tuta'e (AMS137)

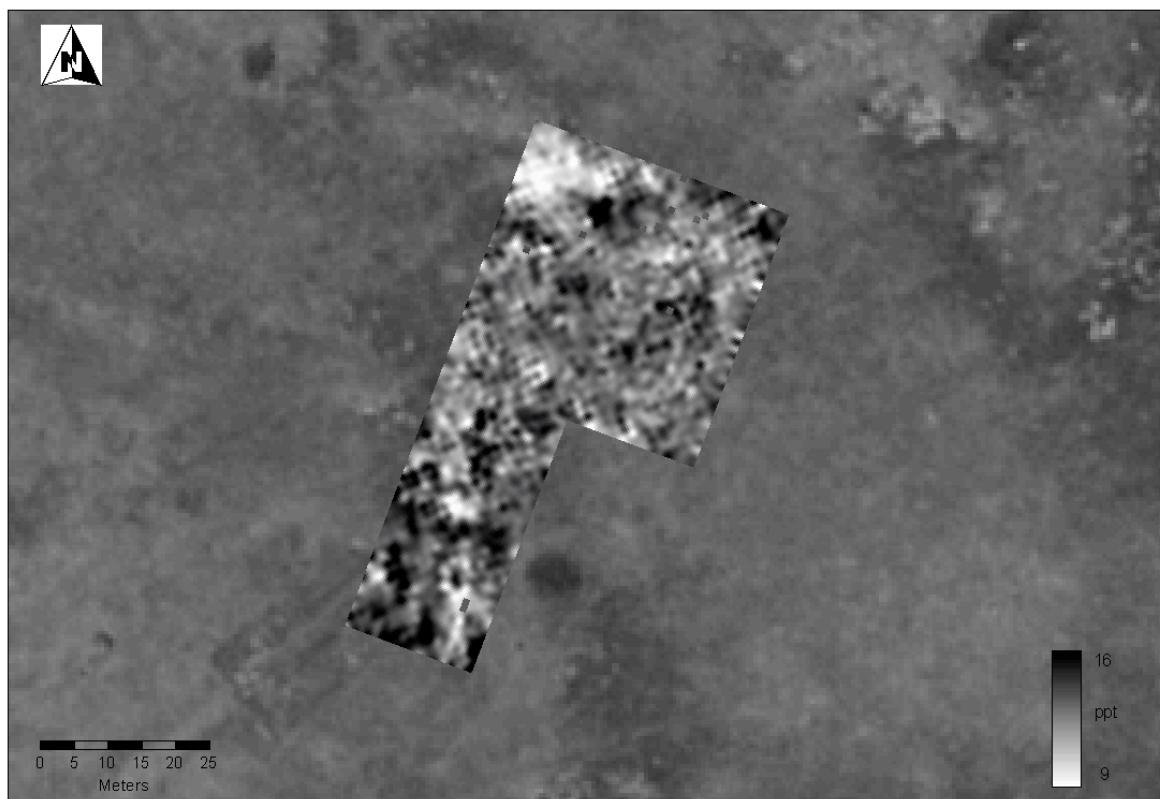
A: Fluxgate magnetometer data



B: Electromagnetic survey data: conductivity (horizontal mode)



C: Electromagnetic survey data: magnetic susceptibility (horizontal mode)



Appendix 4. *Moai* Conservation Record Sheet

LOC — *ARA MOAI* STATUE STATE OF PRESERVATION

<i>Moai</i> no:	Site Name:	Associated Feature Nos:		
Previously noted (tick)	Atlas:	Hunt:	Shepardson:	Other:
Easting:		Northing:		
Statue height:		Statue width (across base):	Statue thickness (from back to front at girth):	
Photo Nos (yes/no):				
Land use:		Physical relationships:		
Position of statue (tick):		Supine	Prone	On left side
Description/interpretation:				
Orientation of long axis of statue:		Declination of long axis of statue:	Alignment with <i>Ara Moai</i> :	
Direction of geological bedding with relation to the statue's longitudinal axis (tick)	Parallel	Horizontal	At angle	
Date:		Initials:		
Page 1 of 2				

Moai preservation/threats

Nature of damage/threat	Back	Front	Right side	Left side	Base	Top of head
<i>Overall condition (Score 1-4):</i>						
1. Loss of features						
<i>Weather-related damage (Score 1-4)):</i>						
2. Gullying (rainwater etc.)						
3. Stone disintegration						
4. Fissures						
5. Cracks						
6. Fracture						
7. Cavities						
8. Lamination						
<i>Other surface features (Score 1-4):</i>						
9. Silica deposits						
10. Salt efflorescence						
11. Darkening due to humidity						
12. Lichen						
13. Moss						
14. Vegetation						
15. Loose seeds						
16. Bird excrement						
17. Honeycomb						
18. Fire damage						
<i>Livestock/human damage:</i>	Yes/no	Locations on statue				
19. Abrasion						
20. Smoothed/polished areas						
21. Broken off						
22. Graffiti						
<i>Locational characteristics:</i>	Yes/no	Comments				
23. Sedimentation						
24. Marine spray						
25. Exposure to birds						
26. Vulnerability						
Additional comments:						
Key:						
1 = none						
2 = minor < 33.3% of the visible area						
3 = medium 33.3% -66.6% of the visible area						
4 = major > 66.6% of the visible area						
NB in the case of loss of features the score relates to the degree of damage rather than the area covered						
Page 2 of 2						

Appendix 5. Weathering on the Fronts of *Moai* Record Sheet

LOC — WEATHERING ON THE FRONTS OF MOAI

SITE NAME				AMS NO	
MOAI NO		GRID REF			
Position of moai (circle): standing standing at angle (draw overleaf) prone supine on side					
RIGHT SIDE			LEFT SIDE		
Position on body	Severity		Position on body	Severity	
Upper eye	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Upper eye	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Lower eye/ cheeks	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Lower eye/ cheeks	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Lower chin	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Lower chin	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Chest	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Chest	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Lower stomach/ hands	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Lower stomach/ hands	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Lower nose	Not visible light moderate heavy	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
COMMENTS					
INITS				DATE	

